

MISCELLANEOUS NOTES (CHIEFLY TAXONOMIC) ON EUCALYPTUS. i.

BY J. H. MAIDEN, GOVERNMENT BOTANIST AND DIRECTOR OF
THE BOTANIC GARDENS, SYDNEY.

1. *E. AMYGDALINA*, Labill.

De Candolle figured the Prodrumus specimen of *E. radiata*, Sieb., in DC., Mem. Myrt. t. 7.

Bentham (B.Fl. iii. 203), quoting the Prodrumus and Mem. Myrt., names this plant *E. amygdalina*, Labill., var. *radiata*. He, however, quotes Sieber's number as 475. A specimen of Sieber's No. 475 I received from the Bot. Museum, Berlin (labelled *E. pauciflora*, Sieb., by the way) is *E. radiata*, Sieb., and probably De Candolle's quotation of 425 is a mere slip of the pen.

I have also an original specimen of Sieber's Fl. mixta, No. 604 [there are, of course, two series, "plant exs" (plantæ exoticæ) and Fl. mixta], which is obviously similar to De Candolle's drawing of *E. radiata*, Sieb., in Mem. Myrt. t. 7. I am, therefore, in a position to speak with authority as to the identification of *E. radiata*, Sieb. Under *E. viminalis*, Bentham (B.Fl. iii. 240) refers Sieber's Fl. Mixt. 604 to *E. viminalis*; there has been some confusion of numbers here which I do not pretend to be able to unravel and which is of no particular consequence.

E. radiata, Sieb., appears to be nothing more or less than a form of *E. amygdalina* very common in New South Wales, and I see nothing distinctive enough to warrant its being called a variety. The typical *amygdalina* from Tasmania, with its linear-lanceolate, often thickish leaves, with hemispherical opercula and hemispherical, usually broad-rimmed fruit, doubtless appeared to

Sieber or De Candolle to be sufficiently different from the New South Wales form. Sieber's type probably came from the higher parts of the Blue Mountains (I have matched it completely therefrom). It is also common in some northern localities. The specimens distributed by Sieber have fruits not dead ripe; when they are quite ripe the tips of the valves are slightly exerted.

Much confusion has gathered round *E. radiata*, Sieb.

Hooker (Fl. Tas.) attributed four forms to *E. radiata*, which I will later on show to belong partly to *E. Risdoni*, Hook. f. var. *elata*, Benth.; and partly to *E. amygdalina*, Labill.

Then Bentham (B.Fl. iii. 203) described a var. *radiata* of *E. amygdalina*, which is a combination of (a) *E. radiata*, Sieb., of (b) Hooker's Tasmanian supposed forms of *radiata*, and of (c) the "White Gum" of Bent's Basin and the Nepean River, N.S.W. (Woolls). The "White Gum" of Bent's Basin I will proceed to deal with.

2. *E. AMYGDALINA*, Labill., var. *NUMEROSA*, var. nov. (vel *E. numerosa*, sp. nov.), in allusion to the very large number of flowers in the umbel.

Syn.: *E. amygdalina*, Labill., var. *radiata*, Benth.

In the 'Catalogue of Indigenous Woods of the Southern Districts of N.S.W.,' prepared by the late Sir William Macarthur for the Paris Exhibition, 1855, we have under No. 109 "*Eucalyptus radiata* (?) " "Kayer-ro," "River Gum of Camden." "A small quick-growing species, very elegant when in blossom; is found only on the immediate sandy banks of rivers; the wood of no value; the inner bark used for tying grafts and other similar common purposes. Height 30 to 50 feet, diameter 12 to 18 inches." The name was supplied by Kew, and it will be observed that it was doubtfully referred to *E. radiata*.

In the 'Flora Australiensis,' as I have already pointed out, Bentham included it with some other trees under his var. *radiata* of *amygdalina*.

It is the tree included by Mueller under *E. amygdalina* in 'Eucalyptographia,' where, quoting Howitt, he speaks of the

"Wang-ngara" of Gippsland. Subsequently Howitt refers to the tree* in some detail.

It was figured and described by Deane and Maiden† as var. *radiata*, Benth.

So that, as far as aboriginal and vernacular names are concerned, it is the "Kayer-ro" of Sir William Macarthur; the "White Gum" of Bent's Basin and the Nepean (Woolls; see B.Fl. iii. 203); and the "Wang-ngara" of Mr. Howitt.

It goes under the names of "River White Gum," "Ribbon Gum," and also "Narrow-leaved Peppermint."

Its favourite habitat is on the sides of gullies, or on the steep banks of rivers, often some distance from the bed of the river or creek, but usually on a well-drained slope leading to a watercourse. It sometimes occurs on flats.

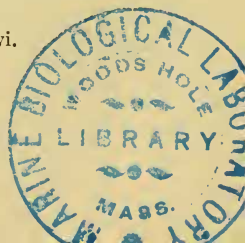
It is often seen as a graceful sapling, but may attain the dignity of a large tree; in this State I have seen it up to 3 feet in diameter and more, with a height of 150 feet. It has rather sparse, drooping foliage, which gives it, at times, something of a willow-like aspect.

Bark.—It is nearly a White Gum when very young, but afterwards the bark of the upper part falls off in thin, long ribbons (hence the name Ribbon Gum), and the lower part of the trunk becomes covered, to a varying height, with fibrous bark of the character known to many as Peppermint-bark. In its most marked form the bark of the butt is more rugged than that of *amygdalina* usually is. Sir William Macarthur spoke of the fibrous bark; and subsequently Mr. Howitt pointed out that the aborigines of Gippsland similarly used the bark for tying and lashing, hence their name for the tree, "Wang-ngara," which signifies "bark-string."

Juvenile leaves.—The young stems have a rusty, glandular appearance, and the leaves are very narrow. I do not note any difference between them and the leaves of the normal species.

* "The Eucalypts of Gippsland." Trans. Roy. Soc. Vic. Vol. ii. Pt. i. p. 86, Pl. x., figs. 1-5.

† Proc. Linn. Soc. N.S. Wales, 1895, p. 606, Pl. lvi.



Mature leaves.—Thin; though usually narrow, up to 14 lines broad, often from 4 to 7 inches long. Although the leaves of this form are very thin, specimens from Bateman's Bay to Wagonga are especially thin. These specimens also have unusually narrow leaves.

Fruits.—Large in number (commonly 20 or more); Mueller counted as many as 43 in the umbel (see 'Eucalyptographia' under *E. amygdalina*). I have often counted them with 40 in an umbel, borne on rather long, often filiform pedicels. They have a very regular umbellate appearance. Mostly pale-coloured when dry. Very uniform in size, 2 to $2\frac{1}{2}$ lines (barely) in diameter and pilular or nearly pear-shaped. Sometimes they tend to close at the orifice. The rim varies in width. In some specimens it is comparatively broad, well-defined and reddish.

Timber.—White, fissile, rather tough when freshly cut, but afterwards of inferior strength. It is easily worked, but not durable on exposure.

4. *E. AMYGDALINA*, Labill., var. *NITIDA*, Benth.

In 1901* Mr. Deane and I described under the name of *E. hæmastoma*, Sm., var. *montana*, a shrubby plant, only two or three feet high, from Mt. Victoria, N.S.W., collected by myself. The bark of so small a shrub was no guide, and the blood-red rims decided us to place it with *E. hæmastoma*, a pardonable error, as it obviously strongly resembles that species.

Since then, however, I have obtained typical *amygdalina*, var. *nitida*, and I find that these specimens precisely match Gunn's No. 808, e.g., Currie's River, Tasmania. The pale brown fruits with the dark red-brown rims arrest attention. The only point in which I can distinguish the Mt. Victoria specimens from those of Currie's River consists in the more obvious oil-glands of those from Mt. Victoria; but this may be in a measure owing to the age (over 60 years) of the Tasmanian specimens. The similarity of the specimens is remarkable when it is borne in mind that the

* These Proceedings, 1901, p. 125.

Tasmanian specimens are mostly from the seacoast, while Mt. Victoria is an inland locality. In a paper* I have given very definite evidence of the absolute similarity of many Tasmanian and New South Wales plant forms, and this is an additional example.

5. *E. RISDONI*, Hook. f. var. *ELATA*, Benth., and *E. OBLIQUA*, L'Hérit. var. *ALPINA*, Maiden (*E. delegatensis*, R. T. Baker).

I propose to enquire into the position of a "Gum-top Stringybark,"† called also, at least in New South Wales, "Mountain Ash."

The botanical names for it are synonyms.

(1) *Eucalyptus obliqua*, L'Hérit., var. *alpina*, Maiden, Report Austr. Assoc. Adv. Science, Vol. ix., 369, footnote.

(2) *E. gigantea*, Hook. f., Fl. Tas., as regards Plate xxviii.; also as regards part of the text.

(3) *E. radiata*, Hook. f., Fl. Tas. i. 137 (non Sieb.) var. 4 (partim).

(4) *E. delegatensis*, R. T. Baker, Proc. Linn. Soc. N.S. Wales, 1900, p. 305.

The receipt of a large number of Gunn's specimens used by Hooker in the preparation of the 'Flora Tasmaniae' has enabled me to clear up some hitherto doubtful points.

E. gigantea, Hook. f., Lond. Journ. Bot. vi. 479, is "Stringybark colonorum." It is in Fl. Tas. (i. 136) described in practically the same words, and it is called "Stringybark Gum." The specimens quoted are Gunn 1095, 1104, 1106, 1965, 1966.

In Part ii. (p. 59) of my "Critical Revision," under *E. obliqua*, I have quoted the remarks of Hook. f. about Gunn's 1095 from Lake St. Clair. The specimens labelled 1095 which have been seen by me are, however, nearly typical *obliqua* from Lake St. Clair. It will be observed that Hook. f. looked upon these specimens as a variety of his *E. gigantea*.

* "A Second Contribution towards the Flora of Mt. Kosciusko." Agric. Gaz. N.S. Wales, 1899.

† See Part ii. p. 68 of my "Critical Revision of the genus *Eucalyptus*."

Hooker says, "in some varieties the young branches have a fine glaucous bloom upon them . . . Lake St. Clair." While Gunn's 1095 from that locality is non-glaucous, some of Gunn's 1100, collected by Hooker himself from Marlborough, (on the Upper Derwent near Lake St. Clair) and which are *E. radiata*, Hook. f. (non Sieb.) No. 4 (partim) are glaucous and are doubtless the specimens he had in mind.

The loose branch of fruits of "*E. giganteus*" figured at fig. 4, Plate 7, of Part 2, of my "Critical Revision," were depicted from the same Kew herbarium sheet that contained the foliage-specimens indicated, and are *E. obliqua* var. *alpina*.

Gunn's 1104 came from Black River, Circular Head, and is typical *E. obliqua*.

Gunn's 1106 came from Sassafras Valley, and is typical *E. obliqua*.

Gunn's 1965 and 1966 came from Arthur's Lakes and are my variety *alpina* of *E. obliqua*. In other words, they are *E. radiata*, Hook. f., No. 4 (partim). They are doubtless the originals of the drawing of Plate xxviii. of Hooker's Fl. Tas.!

Of these four synonyms, therefore, *E. gigantea*, Hook. f., really belongs to *E. obliqua*, in spite of Hook. f. including two trees under that name in Fl. Tas.

E. radiata, Hook. f., is founded on error, and the name should be dropped.

It is a question whether the "Stringybark Gum" or "Mountain Ash" is a variety or a distinct species. Hooker, most Tasmanians whom I have consulted, and I look upon it as a form of *E. obliqua*. Mr. Baker considers it to be a distinct species (*E. delegatensis*). I am well acquainted with the tree in the field, have a very large series of specimens, and I have an open mind on the subject. It is probably a hybrid, *E. obliqua* and *E. coriacea* being the parents.

The affinity of this form to *E. Risdoni*, Hook. f. var. *elata*, Benth., is undoubtedly close, and Hooker's confusion of specimens is readily accounted for. Indeed, at one time I held the view that *E. Risdoni*, its var. *elata*, and my *E. obliqua* var. *alpina*

(*delegatensis*) formed one grand trimorphic species. The strong sweet odour of the trees of *E. Risdoni* var. *elata* in the forest very closely resembles that of *E. obliqua* var. *alpina*. Some Gum-top Stringybarks are undoubtedly near typical *E. obliqua*, and this variation is consistent with the hybridisation theory, since in a series of hybrids the influence of one or other of the parents may predominate.

This form *alpina* of *obliqua* is found in alpine situations in Tasmania, Victoria and southern New South Wales.

6. *E. PLANCHONIANA*, F.v.M.

Glen Elgin, about 30 miles north-easterly from Glen Innes, or about 20 miles easterly from Deepwater and on the eastern watershed (E. C. Andrews).

7. *E. OBLIQUA*, L'Hérit.

Woolloomo Mountain, Parish of Chalmers, County of Durham, Land District of Scone (H. L. White). This locality is interesting as connecting the southern localities with the northern ones. See my "Crit. Revision of genus *Eucalyptus*," Part 2, p. 66.

8. *E. DIVERSIFOLIA*, Bonpl.

Described in Pl. Jard. Malm. 35, t. 13 (1813).

Synonyms—(1) *E. santalifolia*, F.v.M., Trans. Vict. Inst. i. 35 (1855); also ex Miq. Ned. Kruidk. Arch. iv. 133 (1856).

(2) *E. viminalis*, Labill., var. *diversifolia*, Benth.

I have seen Bonpland's exceedingly rare work, and the illustration and description are satisfactory. Mueller (in 'Eucalyptographia,' under *E. santalifolia*) gave the one as a synonym of the other, yet he suppressed Bonpland's species, which had a priority of 42 years over his own. I cannot understand his action, but I am aware of other instances of his arbitrariness in dealing with the laws of priority; he sometimes suppressed a species at his own will. In the 'Eucalyptographia' he speaks of Bonpland's figure, but apparently at second-hand, for the plate contains juvenile foliage (a very rare thing in the earlier figures of *Euca-*

lyptus), bud, fruits, &c. In other words, it is one of the amplest early figures of a species.

E. viminalis, Labill., var. *diversifolia*, Benth. Herb. (B.Fl. iii. 240) is another synonym. Bentham says "*E. viminalis* varies very much in the size and number of flowers and the shape of the operculum. In the original Tasmanian form, common also in Victoria, the peduncles are mostly 3-flowered, although occasionally many-flowered specimens occur. In the S. Australian* *E. diversifolia* the flowers are rather numerous in the umbel and the fruit large." I have seen Bentham's specimens, which are really *E. diversifolia*, in immature fruit.

9. *E. acmenioides*, Schauer; and *E. umbra*, R. T. Baker, these Proceedings, 1900, p. 687.

These species may be at once separated if sucker-leaves be available. Those of *E. acmenioides* are thin and *Eugenia Smithii*-(*Acmena*-) like, while those of *E. umbra* are thick, broad and coarse, much thicker and coarser than those of *E. acmenioides*. They are indeed as thick and coarse as those of *E. capitellata* ever are. The statement in the original description of *E. umbra* that the sucker-leaves are "thin" must be modified.

These two species have been so long confused and are, indeed, so closely related, that it is desirable to endeavour to contrast them.

Where the two species grow in the same district, *E. acmenioides* often grows on the flats or halfway up the hills. It may hence be termed "Flat White Mahogany." It is a Stringybark, the inner bark being white, while that of *E. eugenioides* is yellow. The timber is very like Tallow Wood, and is often substituted for that timber. It is a valuable timber. I have given instances of its durability on other occasions, and would add that there is an old wharf made of this timber at Woy Woy. The tide ebbs

* *E. diversifolia* is a South and West Australian plant, and since the above was written I have recorded it (Vict. Nat. xxi. 116) from Portland, Victoria, also.

and flows over it, yet it is nearly sound after 47 years. The tree grows up to 5 feet in diameter.

E. umbra grows in drier situations, and even on the tops of hills. It may therefore be termed "Mountain White Mahogany." It is not long in the bole, for it soon branches out. Like *E. acmenioides*, it grows up to 5 feet in diameter, and has a white inner bark. It has an inlocked, wavy timber of a valuable character. The differences between the timbers of *E. acmenioides* and *E. umbra* require to be worked out. *E. umbra*, long looked upon as a coast variety of *E. acmenioides*, has a flat-rimmed fruit and is the form which connects with *E. pilularis*, as pointed out by Bentham. The leaves and buds also support that affinity.

Usually the flat-rimmed fruit is accompanied by thick foliage, indicating *umbra*. But sometimes this coarse foliage accompanies thin-rimmed fruits which one has hitherto assigned to *E. acmenioides* without hesitation. Such, for example, is the "Messmate" of Awaba, which grows on foot-hills, moist places, not swamps. These specimens certainly show a transit between *E. umbra* and *E. acmenioides*, and in the present state of our knowledge I doubt if we can always separate the two species in the absence of juvenile foliage.

10. *E. SIEBERIANA*, F.v.M.

Copy of original label of Mr. C. S. Wilkinson, late New South Wales Government Geologist. "No. 6. 'Stringybark,' 'Messmate.' Trees up to 4 feet in diameter growing straight and lofty, the trunk covered with deeply furrowed fibrous bark of dark brown colour, resembling that on Ironbark, but not so hard. Branches and boughs smooth and white. Dromedary Ranges, 1,500 feet above sea-level. Formation Silurian, 2nd November, 1878" (National Herbarium, Melbourne).

Mueller originally labelled this *E. haemastoma*, and then cancelled it for *virgata* and *Sieberiana*. The specimens are typical *E. Sieberiana*, F.v.M., and the reasonableness of the confusion with *E. haemastoma* and *E. virgata* a quarter of a century ago is quite obvious and has often been explained by me.

In describing *E. Wilkinsoniana* (a very different plant whose position I shall refer to in my next paper), Mr. R. T. Baker does not even mention *E. Sieberiana*, and makes certain observations in regard to *E. hæmastoma*, Sm., which species-name had been introduced by Mueller into a discarded label as already shown, and into a note in Part ii. (1879) of the 'Eucalyptographia' under *E. hæmastoma*.

11. *E. SIDEROPHLOIA*, Benth., var. *GLAUCA*, Deane and Maiden.

These Proceedings, 1899, p. 461.

"On the sides of hills and out of the crevices of rock, all over the district, not perhaps plentiful, but widely scattered over the hills." A stunted tree, Gungal, near Merriwa (J. L. Boorman).

This perhaps may be confused with *E. sideroxylon*, A. Cunn., var. *pallens*, Benth., in the absence of fruits. It is perhaps identical with the "Silver-leaved Ironbark" of New England, W. Woolls, of Part 13 of my 'Forest Flora of New South Wales.' I have not fruits of the latter.

12. *E. BAUERIANA*, Schauer.

See these Proceedings, 1902, p. 214.

Thirteen miles from Stanthorpe, Queensland (A. Murphy; March, 1904). "A box-tree with bark like *hemiphloia* and continuing rough out to the young limbs; timber very hard." Fruits very large.

Other localities not previously enumerated are: "Tingha, 2800 feet, on granite (R. H. Cambage);" Bolivia, near Tenterfield, "bark persistent to the smallest branches" (H. Deane, 1885).

With reference to p. 219 (*op. cit.*) I have also seen var. *conica* in Queensland, near Wallangarra.

13. *E. HEMIPHLOIA*, F.v.M., var. *ALBENS*, F.v.M.

A White Box from Gulgong (J. L. Boorman), "plentiful all over the lowlands of this district," adds another to forms of *E. hemiphloia*. Compared with typical var. *albens* its fruits are smaller, its pedicels are absent, and it is markedly constricted at

the orifice, giving the fruits a distinctly ovoid appearance. Specimens from other districts connect absolutely with the type.

14. *E. ODORATA*, Behr. *E. CAJUPUTEA*, F.v.M.
 E. ACACIOIDES, A. Cunn. *E. WOOLLSIANA*, R. T. Baker.

In Trans. Roy. Soc. S. Austr. 1903 (pp. 240-252) I published a paper on *E. odorata*, Behr. Examination of some type-specimens which have come into my hands since 1902 (the year the above paper was written); recognition of the fact that under *E. odorata* two series of plants,—those with broadish and those with narrow suckers—have for many years been included; and acceptance of the fact of hybridisation in the genus, have all contributed to modification of some of the views expressed in that paper.

E. odorata is usually a tree, the "Peppermint" of South Australia. It may be also a Mallee. The narrow-suckered forms may be Mallees, or less commonly trees. The hybrids are usually trees.

Let me arrange certain trees in the following ways:—

A.—RED TIMBERS.

1. *E. odorata*, Behr.
2. The Ironbark Boxes.
3. *E. cajuputea*, F.v.M.
4. *E. acacioides*, A. Cunn.

B.—PALE OR BROWN TIMBERS.

1. *E. Woollsiana*, R. T. Baker.
2. *E. hemiphloia*, F.v.M., var. *microcarpa*, Maiden.

A¹.—PLANTS WITH BROADISH SUCKERS.

- a. *E. odorata*, Behr (typica), Syn. *E. calcicultrix*, F.v.M.
- b. *E. hemiphloia*, F.v.M., var. *microcarpa*, Maiden.
- c. The Ironbark Boxes.

B¹.—PLANTS WITH NARROW SUCKERS.

- a. *E. cajuputea*, F.v.M., Syn. *E. polybractea*, R. T. Baker.
- b. *E. acacioides*, A. Cunn., Syn. *E. viridis*, R. T. Baker;
 E. odorata, Behr, var. *linearis*, Maiden.
- c. *E. Woollsiana*, R. T. Baker.

The width of the juvenile foliage and the colour of timber are of course variable, within certain limits, in *Eucalyptus*.

E. odorata, Behr (*E. calcicultrix*, F.v.M.), "Peppermint der Kolonisten" of Behr. Broadish ovate juvenile leaves. Well-marked (*E. loxophleba*-like) venation, intramarginal vein at a considerable distance from the edge. Colour bright, often sap-green. Buds scarcely angular, but showing angularity somewhat. Rim of fruit often accentuated, like that of *E. leucoxydon* and *E. melliodora*. Runs imperceptibly into *E. porosa*, F.v.M., which it includes.

E. cajuputea, F.v.M., in Miq., Ned. Kruidk. Arch. iv. 126 (1856).

Type from Flinders Range, S.A.

Rather narrow juvenile foliage; rather narrow leaves, but variable in width. Angular calyces and buds. Fruits sub-cylindrical or hemispherical, spreading at the mouth. More or less angular, sometimes nearly sessile as regards the pedicels. The filaments of the anthers often dry reddish.

This form has sometimes purple filaments when fresh (hence var. *erythrandra*) and the normal species has sometimes filaments of that colour also.

It appears to me identical with *E. odorata*, var. *erythrostoma*, Miq., and var. *erythrandra*, F.v.M.; also *E. perforata*, F.v.M.

In the original description of *E. perforata* we have "Cortex ramorum juniorum interdum nigrescit," hence the "Black Mallee" of Adelaide (referred to *E. calcicultrix* in my paper through inadvertence) and other localities.

E. odorata, "forma *angustifolia*," Miq., from Port Lincoln district (Dombey Bay) is identical with the preceding. It requires care to distinguish *E. cajuputea* from *E. odorata*. With sucker-leaves it is easy enough.

E. acacioides, A. Cunn.—This has been distributed amongst many first-class herbaria labelled in Cunningham's handwriting, but its identity was not established until I drew attention to it in my paper on *E. odorata*. While most commonly a Mallee, it

is sometimes a small tree. It is identical with Mr. Baker's *E. viridis*.

In the latter species we have greener and usually less glaucous leaves than in *E. polybractea*, but in juvenile and mature leaves or fruits they seem to run into each other. Typical *viridis* from Girilambone has not only broadish leaves, but a glaucous cast on the young leaves. Indeed both it and *cajuputea* (*polybractea*) are closely related, and both have close affinity to *E. odorata*.

The leaves have often a dull and bluish type of green, and often have a channelled appearance as if a depression on the upper surface was caused by the midrib.

The Ironbark-Boxes.—These seem to me to be indubitable hybrids. Mr. R. H. Cambage* has pointed out the probability of an Ironbark-Box of the Lachlan† being a hybrid between *E. sideroxylon* and *E. Woollsiana*. He has also suggested the hybrid character of the Ironbark-Box or Bastard Ironbark of Nymagee, and the White Ironbark or Ironbark-Box of Barmedman; and I would add the Cooburn or Black Box of Narrabri. I only mention these forms because they have been referred to at some length in my paper on *E. odorata*, a species they closely resemble in bark, timber, buds, &c.

The foliage of the Ironbark-boxes is duller than that of *E. odorata*, and the venation less marked.

Mr. Cambage's observations as to the evolution of these forms are interesting, and must be borne in mind in considering the relations of the western "Boxes." I confine myself at this moment to emphasising the resemblance of these forms to *E. odorata*.

* These Proceedings, 1900, p. 715.

† Mr. R. H. Cambage writes to me:—"I should say that the Nymagee and Condobolin trees are associated with the narrow-leaved form of *E. Woollsiana*, and even the Barmedman ones are rather more the narrow forms than the broad, but it is getting difficult in the latter place." The "Narrow-leaved form of *E. Woollsiana*" is the form that, I recommend presently, should be known as *E. Woollsiana*, the broader-leaved forms really belonging, in my opinion, to *E. hemiphloia*.

It is not desirable to name these forms until after further enquiries as to their relationship.

E. WOOLLSIANA, R. T. Baker.

We now come to some interesting forms included under the above name. For the sake of making my observations clear, I will call Mr. Baker's type-specimens *Woollsiana* No. 1 and *Woollsiana* No. 2.

1. *Woollsiana* No. 1 (Girilambone to Condobolin, W. Baeuerlen, Sept. 1900).

This form is common in Western New South Wales, where it is often known as "Narrow-leaved Box." For example, it is common from Dubbo to the N.S.W. railway line and further west, e.g., Mt. Boppy. It also extends to the vicinity of the coast in Northern New South Wales and Queensland.

The juvenile foliage is narrow; the mature leaves are rather narrow, but they vary somewhat in width. The leaves are often shiny, but they may be dull. The fruits are quite small, and the rim is sometimes well-defined.

It is to this form that I think the name *E. Woollsiana*, R. T. Baker, should, to save confusion, be restricted.

2. *Woollsiana* No. 2 (Condobolin, W. Baeuerlen, 26th March, 1901). Leaves coarser and broader than the preceding; near to the *hemiphloia* type. Fruits rather larger and duller. Sometimes the fruits are not smaller than those of typical *hemiphloia*. The juvenile foliage broadish. This is my *E. hemiphloia* var. *microcarpa*. I adhere to the opinion that it is simply a form of *E. hemiphloia*, which it resembles in juvenile foliage, bark, timber and other characters. Collectively the two forms include much of the "small-fruited Box" of the west with pale or brown-coloured timber in contradistinction to the red-timbered Boxes.

Woollsiana No. 2 is very common in the west, particularly the south-west. It occurs also in Victoria and South Australia.

As compared with *E. odorata*, the fruits are smaller, the leaves less markedly veined, while the timber of *E. odorata* is of course red or reddish-brown.

Woollsiana No. 2 can no more be included with *Woollsiana* No. 1 than can *E. dives* and *E. Cambagei* with *amygdalina* and *goniocalyx* respectively.

The term "Mallee Box" is not always applicable to forms included under *E. Woollsiana*, while other species or varieties are also termed "Mallee Box."

Of the identity of *E. cajuputea* and *E. polybractea* I have little or no doubt. Of the identity of *E. acacioides* and *E. viridis* I have little or no doubt. Of the identity of *E. cajuputea* and *E. acacioides* I am not absolutely certain, and therefore keep them separate for the present. Perhaps one is a variety of the other. That there is transit from *E. cajuputea* and *E. acacioides* to *E. Woollsiana* No. 1 I have no doubt.

I make the above remarks partly in contemplation of the following specimens:—

(1) At Minore, N.S.W., (J. L. Boorman) we have normal *acacioides* and also a coarser form with fruits more spreading at the orifice. It is near *E. cajuputea*; it is near *E. Woollsiana* No. 1. Both are Mallees.

(2) Mr. Baker's type-specimens of *E. viridis* from Girilambone are rather coarse-foliaged, with leaves up to $\frac{1}{2}$ in. diameter. My *odorata* var. *linearis* specimens have narrower and perhaps thicker leaves. The "Green Mallee" is indeed variable.

(3) *E. cajuputea* is very near *E. acacioides*. For example, Dombey Bay, S.A., specimens show the very great difficulty, perhaps the impossibility, of separating *E. cajuputea* from the Green Mallee (*viridis*) and from the Blue Mallee (*polybractea*).

Much collecting yet requires to be done. We particularly require juvenile foliage, and axe-cuts of the timber of as many forms as possible. It is far from my thoughts that I have settled the affinities of the "Western Boxes." But I have carefully studied the types, and have travelled much amongst them in the bush; and I hope that this contribution will tend to finality amongst these bewildering forms.

15. *E. ALPINA*, Lindl.

Leaves usually broader and thicker than those of *E. capitellata*, Sm., though the latter is sometimes very similar to *E. alpina* in this respect.

Buds.—The buds are as rugose as possible. While in most specimens the rugosity is irregular, in others it is more or less disposed in parallel ridges. Rugosity of the buds is also seen in *E. capitellata*, although I am not aware that attention has been previously drawn to it. Thus we have it in a marked manner in specimens from the Grampians, Victoria, 2,000 ft. (H. B. Williamson. Specimens from this locality, cultivated in South Africa, lose much of their rugosity). Specimens showing less rugosity are Darlimurla, South Gippsland (H. Deane); and also tops of the Blue Mountains, N.S.W., and other high elevations.

Anthers.—Let us examine some anthers.

(1) *Eucalyptus capitellata*, Sm., (typical) from Kogarah, Sydney. Anther cells divergent, rather broader than long, opening in slits.

(2) *E. capitellata*, Sm., from Grampians, 2,000 ft., Victoria (H. B. Williamson, Jan. 1901). Anther cells divergent, hardly broader than long, opening in slits.

(3) *E. alpina*, Lindl., from Grampians, Victoria (C. Walter, Dec. 1887). Anther cells parallel, decidedly longer than broad, opening in parallel slits.

The structure of the anthers is the same in the three specimens, *i.e.*, two cells opening in longitudinal slits, and attached to the filament near the top. In No. 3 the cells are long and parallel; in No. 2 they are shorter and more spreading; and in No. 1 still more spreading. We have, indeed, a continuous series.

Fruit (of *alpina*) very variable both as regards size, shape and sculpture. Those figured in the 'Eucalyptographia' may be taken as one pattern. Then I have specimens from Mt. Abrupt (H. B. Williamson) almost 1 inch in diameter!, valves 7, the calyx hardly rugose, the rim broadish and truncate (horizontal). A second specimen from Mt. Zero (D'Alton) has the fruits $\frac{5}{8}$ in. in diameter, valves 5, the calyx very warted, the rim domed, and

the valves as exerted as possible. A third specimen exhibits minor differences.

I have seen two of Lindley's type-specimens of *E. alpina* :—

(a) "No. 243. Summit of Mt. William, Major Mitchell's Expedition, 1836," with the addition in Lindley's handwriting, "*Eucalyptus alpina*, n" [mihi]. In bud only. Herb. Cant. ex herb. Lindley.

(b) "No. 243 of Major Mitchell's Expedition, *Eucalyptus alpina*. Interior of New South Wales" [Victoria had not then been separated. J.H.M.]. In fruit only. Herb. Cant. ex herb. Lemann.

These specimens have rugose buds, but comparatively small, nearly smooth fruits. They are very close to the specimens of *E. capitellata* already referred to as Grampians (H. B. Williamson).

Lindley's original description says :—"Ramulis brevibus rigidis angulatis, foliis alternis petiolatis ovato-oblongis viscosis basi obliquis, umbellis axillaribus paucifloris petiolis brevioribus, operculo hemisphærico verrucoso inæquali tubo calycis turbinato verrucoso brevior" (Mitchell's 'Three Expeditions,' ii. 175). Mitchell himself simply says, "Near the highest parts of the plateau I found a new species of Eucalyptus with short broad viscid leaves and rough-warted branches." So that although the specimens from the top of the mountain are intended to be the type, the specimens distributed have included some specimens of *E. capitellata*, Sm.

Affinities.—Bentham ('Flora Australiensis') places *E. alpina* between *E. globulus* and *E. cosmophylla*. Mueller ('Census') places it between *E. preissiana* and *E. globulus* and near *E. cosmophylla*.

The determination of affinities of species of Eucalyptus is, however, very complex, and can only be ascertained by judicial consideration of a number of factors, *e.g.*, shape of juvenile leaves, shape and venation of the mature leaves, principal constituents of oil, anthers, fruit, bark, timber, kino, habit, &c., and not one or two of them solely. But I think I have shown that the relations of *E. alpina*, Lindl., and *E. capitellata*, Sm., are very

close; and doubtless additional evidence will be forthcoming as to juvenile foliage, oil, bark, timber, &c. My observations as to the transition forms of anthers may cause botanists to give more attention to this aspect of variation.

16. *E. CLADOCALYX*, F.v.M., *Linnea*, xxv. 388 (1852).

Syn. *E. corynocalyx*, F.v.M., *Fragm.* ii. 43 (1860); *E. Cooperiana*, F.v.M., *Fragm.* xi. 83 (1880).

In the 'Eucalyptographia,' under *E. corynocalyx*, Mueller himself quotes *E. cladocalyx* as a synonym, but he offers no explanation of his action in suppressing a name in favour of one given eight years later. I have turned to the original description of *E. cladocalyx*, and find that it is quite in order. The type came from the Marble Range (near Port Lincoln, S.A.), and it was originally described as a shrub. The name must be restored, and this should have been done years ago, before *corynocalyx* came so extensively into use. The laws of nomenclature cannot be set aside at the will of any man, however eminent.

I have examined the type of *E. Cooperiana*, F.v.M., from King George's Sound (Maxwell), and cannot see that it differs in any essential character from *E. cladocalyx*, F.v.M. The peduncles and pedicels of *E. Cooperiana* are broader than those of *E. corynocalyx*. The range of this species therefore extends to Western Australia. Bentham included *E. Cooperiana* under *E. decurva*, F.v.M.

17. *E. PATENS*, Benth.

(1) *E. pachyloma*, Benth. (B.Fl. iii. 237), a synonym.

Preiss, under No. 252, distributed both flowering and fruiting specimens. They (or at least the flowers) were obtained "in arenosis silvæ ad fl. Swan River. Oct. 1839 florens." The flowering specimens belong to *E. rudis*, Endl., while the fruiting specimens belong to *E. patens*, Benth. Bentham, indeed, first pointed this out, for he says "The fruiting specimens distributed by Preiss (not described by Schauer*) belong to *E. patens*, which has much

* Nor did Endlicher describe the fruits in *Enum. Pl. Hügel*, No. 157, p. 49. The type came from "King George's Sound." It is obvious that the whole trouble has been caused through the erroneous matching (by Preiss) of flowering and fruiting twigs under his No. 252.

resemblance to *E. rudis* in foliage, but differs in inflorescence, flowers and fruit."

I have seen several fruiting twigs of Preiss' No. 252, and concur in Bentham's determination. One of the specimens, however, bears the label in Bentham's handwriting "*E. platyloma*, Benth.," doubtless a slip of the pen for *E. pachyloma*. Therefore *E. pachyloma*, Benth., is a synonym of *E. patens*, Benth. Mueller, however, suggested that *E. pachyloma* might be looked upon as a synonym of *E. santalifolia*, F.v.M. (*E. diversifolia*, Bonpl.) as will be seen from a passage in 'Eucalyptographia' under *E. Oldfieldii*.

(2) *E. Todtiana*, F.v.M., is perhaps a synonym also.

I am of opinion that *E. patens*, Benth., and *E. Todtiana*, F.v.M., may not be specifically distinct. The juvenile foliage and the timber of both species should be compared by local botanists to see if there are more fundamental differences than those disclosed by flowering and fruiting twigs. *E. pachyloma*, Benth., comes nearer to the *Todtiana*-form than to typical *patens*; and if my suggestion that *Todtiana* is a mere form of *patens* be agreed to, it and *E. pachyloma* might be included under *patens* under the varietal name of *pachyloma*.

18. *E. PULVIGERA*, A. Cunn., in Field's Geog. Mem. N.S. Wales, 1825.

See these Proceedings, 1899, 465; also 1900, 110 (recorded by Deane and Maiden under *E. pulverulenta*, Sims), and 1901, 126 (recorded by the same under *E. cordata*, Labill.); Mr. R. T. Baker (Rept. Austr. Assoc. Adv. Science, ix. 345, 1902) looks upon it as *E. pulverulenta*, Sims.

I have recently (in company with Mr. R. H. Cambage) paid a visit to Allan Cunningham's type-locality for *E. pulviger*, viz., Cox's River. The plant there is identical with that collected by Mr. Cambage at Cow Flat near Bathurst.

It has a somewhat Mallee-like growth, though without the root-stockiness of a Mallee. It may be quite prostrate, quite erect, or spreading and rambling. It has long weak stems of

pretty uniform diameter of say two inches, with an average height of say eight feet. At the same time I have seen it three inches in diameter, with a height of fifteen feet. Its trunk is smooth, with ribbons, and its timber white.

As to the nomenclature of Cunningham's plant, it has, as already stated, been suggested that it is the *E. pulverulenta* of Sims' Bot. Mag. When I was in England I ascertained that an absolutely authentic specimen of Sims' plant was not in existence, and I see no reason for disturbing the generally accepted view that the Argyle Apple is *E. pulverulenta*.

A portion of Mr. Baker's argument (*loc. cit.* p. 346) is based on inference connected with the difficulty of getting seed to England in time for flowering in 1819 (date of Sims' plate). Mr. Deane and I have already (these Proceedings, 1901, p. 550) dealt with this objection. Nevertheless it may be shown that George Caley, Sir Joseph Banks' seed and plant collector, was in *E. pulverulenta* country at least as early as 1804.

I feel very strongly that priority of a species may not be disturbed on deductive evidence of that kind which does not amount to absolute certainty. The destruction of the so-long undisturbed application of the name *E. pulverulenta* to the Argyle Apple can only be permitted on the clearest evidence. At the same time I think that the differences between *E. pulviger*, A. Cunn., and *E. cordata*, Labill., may be sufficient for us to keep them apart for the present. I therefore, though with diffidence, recommend that Allan Cunningham's name of *E. pulviger* be allowed to stand for the Cox's River and Cow Flat plant. The species is undoubtedly very close to *E. cordata*, Labill. Compared with that species it is a slenderer tree, has smaller leaves, which are more coriaceous and which are entire (not frequently crenulate as in *E. cordata*). The valves of *E. cordata* are more sunk, those of *E. pulviger* being exserted and the rim being grooved (there is some grooving in a type-specimen of Labillardière). The shape of the fruit of *E. pulviger* tends to be urceolate, while that of *E. cordata* is more hemispherical.

E. pulviger is a rare and a disappearing species. It is confined to dry, rocky situations, and is what may be termed a "hardy" form. While it and *E. cordata* have doubtless sprung from a common stock, their foci of occurrence (Cox's River, &c., and Tasmania) have been so long separated that the two forms have acquired characters which possess a certain amount of stability.

19. *E. PULVERULENTA*, Sm., and *E. NOVA-ANGLICA*, Deane and Maiden.

In these Proceedings, 1901, pp. 547-555, I included *E. nova-anglica* under *E. pulverulenta*. I propose to re-examine the position.

Typical *E. pulverulenta*, the "Argyle Apple," has the fruits in 3's and rather coarse, broad thickish foliage, and thick reddish fibrous bark, grey on the outside, and reddish timber.

Incidentally I may mention, in regard to *E. pulverulenta* (though the observations are of wider application), that this glaucous species varies in glaucousness according to the season. Thus specimens collected in the Tumut district (*a*) by me in August, have scarcely a trace of glaucousness; (*b*) by Mr. Froggatt, in October, are more glaucous; and (*c*) by Mr. Betcher, in January, are as glaucous as they can be.

Typical *nova-anglica* has the fruits numerous (more than 3's) and smaller than those of *E. pulverulenta*. It is common in New England and also in Victoria, being one of two trees (the other being *E. Gunnii*, var. *acervula*), formerly named *E. Stuartiana*. The situation is explained in these Proceedings, 1902, p. 569.

E. nova-anglica has leaves more commonly lanceolate than *E. pulverulenta*, but of course lanceolate leaves in typical *pulverulenta* are frequent; the juvenile leaves are not really different; bark and timber are identical.

It has been stated that the fruits of *E. pulverulenta* are always in 3's. This is not, however, the case. Specimens from T. O'Rourke, Buchan, Gippsland (A. W. Howitt) "Red Stringy-

bark with whitish blue leaf; grows on swampy ground," are in every respect similar to typical *E. pulverulenta*, except that the flowers are in more than 3's.

The same remarks apply to Mr. Howitt's specimens from Moe, Gippsland, with flowers up to 8 in the head. Some of the specimens have the normal *pulverulenta* foliage, while others are lanceolate. So that, while I would like to accept the simple arrangement of looking upon *E. pulverulenta* as with flowers in 3's, and *E. nova-anglica* as with flowers in more than 3's, specimens like these aggravatingly break down such classification.

Then take the specimens from Beechworth, Vic. (Falck), quoted also in my former paper. This tree has thick reddish fibrous bark; the leaves are all lanceolar, and the flowers are in 3's.

Then again we have—"Small tree, with a bark like the Mahogany (*e.g.*, soft, red, and fibrous, J.H.M.) thirty feet high and a foot in diameter, grows in swampy heathy flats between Narrabarba and Eden and Cape Howe. Wood dark red" (J. S. Allan). These have flowers in more than 3's, but otherwise I cannot tell the difference from the Beechworth specimens.

I have only referred to a small number of the very abundant specimens in the National Herbarium, but, having again reviewed the evidence with an open mind, I think that my view of looking upon *E. pulverulenta* and *E. nova-anglica* as one species is a correct one. I have tried to separate them, and these intermediate specimens persist in spoiling such an arrangement. At the same time I cannot find fault with those who cling to the desire to keep the species apart. I will, indeed, seek for further evidence to keep them apart.

20. *E. ACACIÆFORMIS*, Deane and Maiden.

The bark and timber are similar to those of *E. nova-anglica*. I cannot indicate any difference between them. The species grows amongst *E. nova-anglica*; and the affinities of the two species are closer than between *E. acaciæformis* and *E. Stuartiana*, F.v.M.

21. *E. AMPLIFOLIA*, Naudin, 2nd Mém. p. 28; these Proceedings, 1903, p. 893.

E. tereticornis, Sm., non var. *latifolia*, Benth., B.Fl. iii. 242. Suggested that it might perhaps be a form of var. *latifolia*, Benth., by Maiden in Bull. Herb. Boissier, 1902, p. 571; Forest Flora, N.S. Wales, Part xi. p. 7.

I am satisfied that this "Swamp Gum" or "Broad-leaf Blue Gum" is a distinct species. In its commonest form it is a small or medium-sized tree, inclined to a crooked stem and scrambling branches, with long, narrow, horned or tapering opercula (the arrangement of the buds is usually stellate) and small fruit, the valves well exerted and numerous in the head. It is common in damp situations in Western New South Wales and Queensland, but may occur in dry rocky places. The juvenile foliage is always broad and often with the venation very marked. The mature foliage may be broad or lanceolate; its texture varies, but it is usually coriaceous. Its transit to normal *tereticornis* appears (in one direction) to be through *E. angulosa*, Naudin, a form I cannot recognise as of specific value.

I hope to make some observations concerning *E. cymicina*, R.Br.; and *E. tereticornis*, Sm., var. *latifolia*, Benth., in my next paper.

22. *E. TERETICORNIS*, Sm., var. *DEALBATA*, Deane and Maiden.

In these Proceedings for 1901 (p. 204) Mr. R. H. Cambage has drawn attention to the occurrence of this variety in Mallee-like form at Wirlong near Nymagee. Mr. J. L. Boorman has recently found the same variety in Mallee-form at Gungal near Merriwa. He has two forms which in the National Herbarium are called A and B respectively. A is not so robust as B, and with rather narrower leaves. The fruits of B are larger and more urceolate than those of A.

23. *E. ROSTRATA*, Schlecht.

It is sometimes difficult to discriminate between this species and *E. tereticornis*, Sm. The seedling leaves of the former species are narrow, while those of the latter are much broader.

E. longirostris, Cordier (according to Naudin's specimens No. 15), and *E. ambigua*, Trottier, (?) (Naudin No. 4) cannot be separated by me from *E. rostrata*.

24. *E. EXSERTA*, F.v.M.

Journ. Linn. Soc. iii. 85 (1859); Maiden's Forest Flora of New South Wales, Part xi., Vol. ii., p. 11; compare also *E. Morrisi*, R. T. Baker, these Proceedings, 1900, 312.

Having examined herbarium specimens,* bark and timber of these two species, I am unable to point out any essential difference between them. Typical specimens of *E. exserta* occur in Coastal Central Queensland. Typical specimens of *E. Morrisi* are found in Western New South Wales. It is well known that the Eremæan flora which in New South Wales is far to the west, in Queensland approaches the coast. At the same time more intermediate localities (I have some) for the two species than are at present known should be ascertained, and on their collection it can be decided whether the species are really identical.

25. *E. PLEUROCARPA*, Schauer, in Lehmann's *Plantæ Preissianæ*, i. 132 (1845); *E. tetragona*, F.v.M., *Fragm.* iv. 51 (1864).

Bentham (*B.Fl.* iii. 259) and Mueller ('*Eucalyptographia*') both accept this synonymy, and yet adopt Mueller's name as against Schauer's, which has a priority of 19 years. Schauer's description is in order, and his specimens (which I have seen) are well authenticated. His name must be restored; and it was, indeed, only suppressed through inadvertence consequent on lax ideas in regard to the suppression of names.

I take this opportunity of pointing out that this species has some affinity to the large-fruited forms of *E. incrassata*, Labill.

26. *EUCALYPTUS BANKSII*, sp.nov.

A very large tree up to 100 ft., reminding one of *E. goniocalyx* in habit. Quite glabrous or the twigs a little glaucous. It has clean stems without ribbons and no rough bark.

It is locally known as "Woolly Butt" because the bark is fuzzy to cut.

Juvenile leaves nearly orbicular or oblong, cordate at the base and stem-clasping, strictly opposite, gradually becoming broadly lanceolate and finally lanceolate; texture thickish, glabrous, slightly paler underneath. The midrib prominent, the main lateral veins also conspicuous and making approximately an angle of 45° with the midrib. The ends of these lateral veins connected by loops (brachydodromous), said loops at a considerable distance from the edge. Besides these, there are a large number of fine anastomosing veins. Twigs nearly terete, reddish.

Mature leaves rather large, 9 inches long by $1\frac{1}{2}$ broad not being an uncommon size. Equally green on both sides, falcate, venation rather prominent, intramarginal vein at some distance from the edge, venation spreading.

Buds sessile, the head of 4 to 7 either on a short strap-shaped peduncle or this may be absent. The buds more or less angular by mutual compression. The operculum blunt conical or hemispherical.

Flowers.—Anthers opening in parallel slits.

Fruits small, under $\frac{1}{4}$ inch in diameter, conoid or nearly hemispherical, rim narrow and slightly domed, valves (only three in the specimens seen) well exerted.

Bark of a dull uniform grey; woolly or fuzzy to cut. Not as soft and as Box-like as in *E. Stuartiana*. Branches smooth, not ribbony. The uniformity of the smooth bark of this species (intermediate between that of a gum and a box, and somewhat resembling that of a Grey Gum, *E. punctata* or *E. propinqua*) is notable.

Timber.—A good hard timber, not soft like that of *Stuartiana*. Pale-coloured, a timber of promise, but data not available in regard to its economic merits.

Hab.—On the sides of hills at an elevation of about 3,500 feet in the Wallangarra (New South Wales-Queensland border) district (J. L. Boorman, August, 1904); Emmaville (J. L. Boorman, October, 1901).

Affinities.—This species has been rarely collected, but has hitherto been looked upon as conspecific with *E. Stuartiana* or *E. viminalis*.

1. *E. Stuartiana*, F.v.M.

Two specimens collected by Charles Stuart are in the Melbourne Herbarium and are labelled as follows:—

(a) “*E. Stuartiana*.—Bark rather rough and fibrous. New England” [an old label of Mueller’s to this specimen is “*E. viminalis* var. *capitata*”]. This specimen has leaves and immature fruits. It may be the new species or *E. Stuartiana*.

(b) “Termed here ‘Peppermint Gum.’ A large tree of 40-50 ft., with a wide spreading head. The bark rugose on trunk but smooth on upper branches.”

Mr. Henry Deane collected it near Tenterfield in September, 1885, and his label is “*E. Stuartiana* (?). Seems to approach *E. goniocalyx*. Has long leaves and sessile flowers.”

All the above specimens are sessile alike as regards pedicel and peduncle.

Another specimen “White Gum, Glen Innes, *E. viminalis*” (H. Deane) in leaf and fruit only, has a common peduncle and is referable, I think, to the new species.

Wherever this new species occurs in the same district as *E. Stuartiana*, the former occurs on the hills and slopes, and the latter (as is usual) on flats. It differs also from *E. Stuartiana* in bark and timber, also in the foliage. The new species has rarely glaucous juvenile foliage; it is coarser, and more pedunculate. The mature foliage is much larger and more pendulous than *E. Stuartiana*. As a rule the buds of *E. Stuartiana* are not angular, while the shape of the fruit is different. Its closest affinity appears, however, to be *E. Stuartiana*, and it appears to come between that species and *E. Cambagei*.

(2) *E. Cambagei*, Deane and Maiden. The difference between this species (with which *E. goniocalyx* was formerly united) is in the absence of ribbons in the bark of the new species; it is also white in the inner bark, not yellow like *E. Cambagei*. The

bark of the latter is also much rougher than that of the new species. It is also a larger tree than *E. Cambagei*. As regards the fruits, they are always smaller and less cylindrical than those of *E. Cambagei*.

(3) *E. quadrangulata*, Deane and Maiden. The juvenile foliage sharply separates it from this species. The fruits and bark also are very different, but there is a general resemblance between the two species.

I dedicate this interesting species in honour of the great Sir Joseph Banks.

EUCALYPTUS SCOPARIA, sp. nov.

A slender tree of 30 or 40 ft., with narrow pendulous shiny foliage, and an entirely smooth white bark.

Juvenile leaves lanceolate, symmetrical, tapering to a very short petiole and to a fine-pointed apex. Equally green on both sides. Strictly opposite; penniveined, the lateral veins very fine and anastomosing, the principal lateral veins making an angle of about forty-five degrees to the midrib. Entirely glabrous, and the twigs reddish and terete.

The opposite-leaved character is retained for a considerable period, the leaves becoming thicker, narrower and longer. I have leaves, still in the opposite stage, 3 inches long and $\frac{1}{5}$ inch wide. In this stage the foliage resembles that of *E. amygdalina* (particularly the type Tasmanian form) or of *E. linearis* a good deal. It is seen to have a translucent margin and to be full of oil dots, emitting a peppermint odour when crushed in the warm hand.

Mature leaves up to 6 inches long and $\frac{1}{2}$ inch broad, tapering very gradually into a fine apex. At the base it tapers less gradually into a petiole of perhaps 1 inch. Texture thickish, the midrib alone conspicuous.

Buds nearly ovoid when ripe, with a hemispherical or slightly pointed operculum. Calyx tapering into a short pedicel which may be absent. Peduncle may be $\frac{1}{4}$ inch. Usually three to seven in a head.

Flowers opening in longitudinal parallel cells.

Fruits smooth, usually barely $\frac{3}{16}$ inch in diameter, subcylindrical, rim rather prominent, domed, the valves (indifferently 3 or 4) moderately well exerted.

Bark very smooth and white.

Timber pale-coloured, fissile, probably of no special merit.

Hab.—On the tops of the highest hills (circa 4000 ft.) in fissures of granite rocks around Wallangarra, occurring on both sides of the New South Wales-Queensland border (J. L. Boorman; July, 1904).

Affinities—This tree belongs to the *viminalis-Gunnii* series. From *E. Gunnii* and its forms it is separated by the broadish juvenile leaves of the latter. At the same time some specimens of var. *maculosa* of the latter have juvenile leaves intermediate in width. From *E. viminalis* it is separated by its uniformly multi-flowered character, the absence of ribbons on the bark, the narrower juvenile foliage and other characters.

Its nearest affinity appears to be *E. Smithii*, R. T. Baker, from which it appears to be sharply separated by the markedly smooth bark of the new species. I separate the two trees mainly on that ground, the bark of *E. Smithii* being almost an Ironbark. The timber also of *E. Smithii* appears to be darker.

I add to the species of the *Gunnii-viminalis* group with diffidence, but I believe that the naming of this form will be of practical convenience because of its narrow leaves, multiform flowers and smooth bark. Many Queensland and Northern New South Wales trees far away from the *viminalis* and *Gunnii* type localities (which are Tasmanian), and that of *E. Smithii* (which is Southern New South Wales) belong to a group which, for purposes of nomenclature, may, in my opinion, be usefully typified in the present species. It, however, belongs to a series which is capable of so much variation that it does not appear to be a strong species.

In its narrow pendulous juvenile leaves and smooth bark it reminds one of *E. Seeana*, Maiden. The two species differ, however, in almost every other respect.

I think *E. Smithii*, R. T. Baker, is a good species, and later on I will endeavour to distinguish between it and the multiflowered form of *E. viminalis*, which is difficult.

EUCALYPTUS RUDDERI, sp.nov.

"A Red Box, 120 ft. high, 2-3 ft. in diameter" (A. Rudder, formerly Forester, July, 1885). Mr. District Forester Hardiman also calls it "Red Box." It may perhaps be known as the "North Coast Red Box" by way of distinction.

Juvenile leaves not seen in the youngest stage, but seen when still opposite. Medium lanceolate and acuminate, 4-5 inches long and $1\frac{1}{2}$ broad, with petiole of $\frac{1}{2}$ inch. The midrib often pink. Intramarginal vein at some distance from the edge, the lateral veins roughly parallel and forming part of a delicate anastomosing arrangement. Texture thin; margin undulate. I have seen no sign of glaucousness so far. Twigs angular.

Mature leaves.—These do not appear to differ in any important character from the juvenile ones save in losing their opposite character.

Buds.—Arrangement paniculate, the umbels usually 3 to 6 in number, the peduncles rather long, the pedicels short and the calyx-tube tapering gradually into the pedicel; the operculum conoid. When fresh the buds clavate; the operculum dries to a point.

Flowers small; anthers small, opening in terminal pores, like *E. polyanthemos* and *E. melliodora*.

Fruits small, conoid to subcylindrical, rim thin and the indentations and fissures (common in *E. polyanthemos*) absent or rare. Valves sessile and 5 in number in the specimens seen.

Bark.—"Persistent and like that on the trunk of Grey Box, *E. hemiphloia* (A. Rudder)." The rough bark resembles that of "Brush Box (*Tristania conferta*), but is slightly darker in colour, and extends up to the small branches, further than that of White Box (*E. hemiphloia*)" (J. Hardiman).

Timber.—Wood dark red. Timber durable, of a red colour (A. Rudder). The timber is hard and durable underground. It is used

for sleepers and fencing posts (J. Hardiman). Sap wood white, rest of wood red. I cannot perceive any difference between its wood and that of *E. polyanthemos*.

Hab.—Cundletown, near Taree (A. Rudder). This tree is by no means plentiful, but occurs in all the forests adjacent to the coast, especially in the Counties of Gloucester and Macquarie. The best I have seen are in the parish of Bohnock, a few miles from Taree. It appears to favour stony ridges (J. Hardiman).

This is a tree that Mr. Augustus Rudder brought under my notice many years ago.* I have had it doubtfully under *E. polyanthemos*, to which species it is obviously closely related, but it seems to me distinct.

The juvenile foliage being a character of fundamental importance, I feel I have no option in separating the coast Red Box from *E. polyanthemos*. It seems to stand in the same relation to *E. polyanthemos* that *E. cnoica* does to *E. Baueriana*, and whether it should be looked upon as a variety of *E. polyanthemos* or a distinct species is a matter of opinion. While I propose the name *E. Rudderi* for it, in honour of Mr. Augustus Rudder, others may be inclined to call it var. *Rudderi* of *E. polyanthemos*.

The principal differences are indicated as follows :—

E. Rudderi.

Trunk with fibrous bark somewhat like the ordinary Grey Box (*E. hemiphloia*).

Juvenile foliage lanceolar.
Mature foliage thinner and more uniformly lanceolar.

E. polyanthemos.

Trunk with flaky bark (like *E. tereticornis*) or nearly smooth like a Gum.

Juvenile foliage broader, even tending to orbicular.

* Recorded by me under *E. polyanthemos*, Schauer, these Proceedings, 1903, p. 536.